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ABSTRACT

This report provides a general overview of available courseware for computer assisted instruction by examining the distribution of these packages across grade level, hardware type, instructional mode, and subject areas, including art, business education, computer science, language arts, foreign language, mathematics, science, social studies, special education, and vocational education. Future trends are also identified based on data from the comprehensive RICE (Resources in Computer Education) database, which contains information on microcomputer courseware for elementary and secondary education, and on the experience gained by the MicroSIFT (Microcomputer Software Information for Teachers) staff in coordinating a nationwide courseware evaluation project. (RICE was one outcome of the project.) Graphs used in the report to display the commercially available courseware packages portray the RICE database, but also accurately represent the universe of available courseware. A description of RICE and how to access it is included. (LMM)

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n Analysis of Available Courseware

By Dave Weaver and Don Holznagel

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The success or failure of the CAI (Computer Assisted Instruction) program in a school building or district depends greatly upon the availability of quality educational courseware in the appropriate subject and level. However, as a decision maker you may find yourself in the difficult position of trying to decide important issues relating to the CAI program with little or no information about the availability of courseware.

This report gives you a general overview of the available courseware by examining how these packages are distributed across grade level, hardware type, subject area, and instructional mode. The report also identifies future trends based on data, and on the experience gained by the MicroSIFT staff in coordinating a nationwide courseware evaluation project. One outcome of that project is a comprehensive database called RICE, containing information about microcomputer courseware for elementary and secondary education. MicroSIFT and RICE are based at the Northwest Regional Educational Laboratory.

Ensuing reports in this series will examine courseware in relation to the improvement of instruction in various subject areas.

IR 011 335

ABOUT THE DATA

The data used to construct the graphs in the report were taken from the RICE database, at that time containing 2400 listings of commercially available courseware packages. Since these listings were entered into the database in order of producer upon catalog publication, no particular emphasis was placed on subject, grade level, or hardware type. This implies the database contains a representative sample of all commercially available courseware. Although the graphs actually portray the RICE database, they also accurately represent the universe of available courseware. The raw data taken from the database have been converted to percentage of the total to make it easier to relate to the general case. (More information about RICE is at the end of this report.)

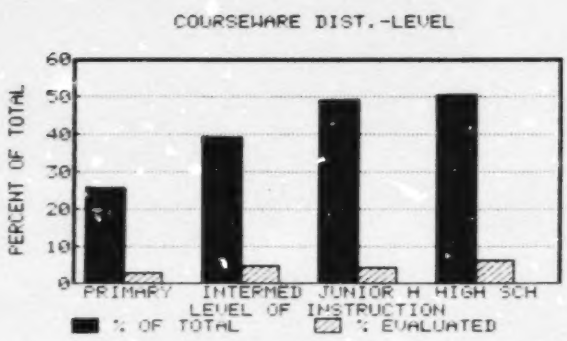
BY LEVEL

Figure 1 displays the relative distribution of commercially available courseware packages by level. It shows that as the student reaches high school, the number of commercially available packages increases.

The data displayed here represent the number of package titles, but it does not necessarily represent how much of

continued

Figure 1



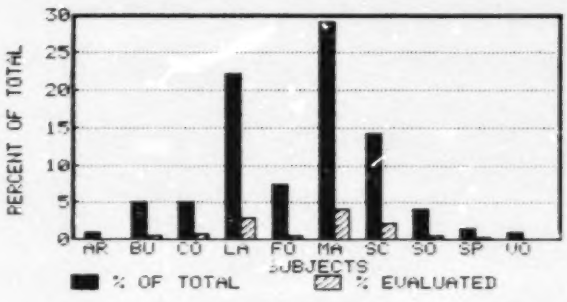
the curriculum is supported by available courseware. Because of the emphasis of basic skills at the elementary level, there is a greater number of comprehensive packages that support a large portion of the curriculum under one title. On the other hand, packages for the secondary level tend to be of the single concept type, which support a smaller portion of the curriculum. Less than 25 percent of available packages are appropriate for primary grades where nearly half are appropriate for high school. The total of the four levels shown is 165 percent. This is because of the large number of packages that span a wide range of levels.

The lighter shaded bars indicate that portion of the package which has been evaluated by an organization such as MicroSIFT. The graph shows that the evaluations are relatively evenly distributed among the various levels. On the average, around 13 to 14 percent of the available packages has been evaluated. The likelihood that anyone could find a published evaluation for every package under consideration for purchase is remote. Even if evaluations were found, the report formats used by the different agencies are likely to be significantly different, making comparisons difficult. Organizations such as MicroSIFT, EPIE, and others are working to solve these problems, but it will be some time before anyone will be able to reap the rewards of these efforts.

BY SUBJECT

Figure 2 displays the relative distribution of commercially available courseware packages by subject. As expected, mathematics is clearly the best supported by available courseware products, followed by language arts and science. With the exception of social studies, the core areas are supported well by availble courseware. Nearly one-third of all available packages is in the area of mathematics. One-fifth is in language arts. The subject areas of business education, computer science, foreign language and social studies have about a 1 in 25 availability ratio. There is very little courseware available in the area of the arts, and of that, most is in music. The total of the 10 subjects shown on the graph is 91 percent. This total is less than 100 percent because not all of the packages listed in RICE are instructional

Figure 2



KEY

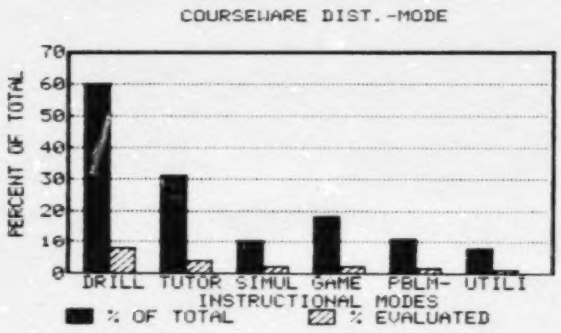
AR Art	MA Mathematics
BU Business Ed.	SC Science
CO Computer Science	SO Social Studies
LA Language Arts	SP Special Ed.
FO Foreign Language	VO Vocational Ed.

in nature. Some of them are administrative or are specific application packages which are not directly related to a subject area. The number of evaluated packages again appears to be relatively evenly distributed among the subjects.

BY INSTRUCTIONAL MODE

Figure 3 displays the relative distribution by instructional mode. 60 percent of the packages employ drill and practice. Drill and practice packages outnumber all others by 2 to 1. The relatively small number of simulations (11 percent) reflects amount of difficulty involved in developing quality educational simulations. One-fifth of the courseware available is some form of game. Games are often used to disguise other instructional techniques or to make them motivating. The total of the 6 instructional modes shown on the graph is 141 percent. This is greater than 100 percent because many packages employ more than one instructional mode.

Figure 3

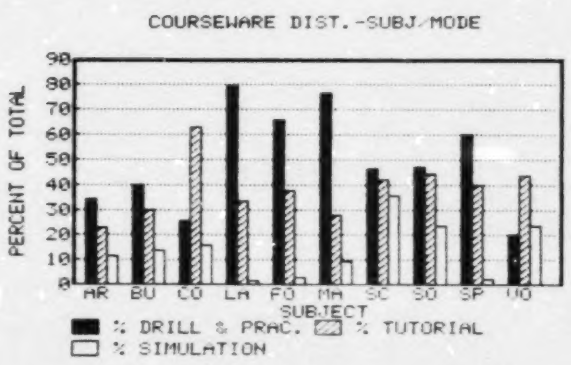


INSTRUCTIONAL MODE WITHIN SUBJECT

Figure 4 shows the relative distribution of courseware in the various subject areas by instructional mode. The instructional mode most often used in courseware packages for a given subject area is shown. Language arts, foreign language, mathematics, and special education all show heavy use of drill and practice. Tutorials are apparent in computer science and vocational education. The number of simulations, although never dominant, is relatively high in science and vocational education. While problem solving was not included on this graph the data indicate that problem solving was involved in 23 percent of the science packages, 16 percent of the math packages, and 14 percent of the social studies packages.

In Figure 4, remember that this graph shows the instructional mode within a subject area. The size of the bars do not represent the number of packages available in that subject. For example, foreign language and language arts appear to be about the same. But Figure 2 shows that there are about three times as many language arts packages as foreign language packages.

Figure 4



KEY

AR Art	MA Mathematics
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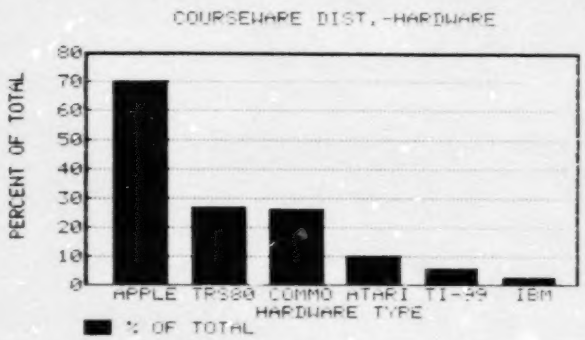
BY HARDWARE TYPE

Figure 5 displays the relative distribution by hardware type. It is apparent that the data base leans heavily toward software for Apple products, by a ratio of nearly 3 to 1. This is attributed to the stability of the Apple computer in the education market. Of the computers included in the data, two (Commodore PET and TI-99/4A) are no longer manufactured, and two more (Atari and Radio Shack) have undergone numerous revisions, making it difficult for the development of a substantial courseware base. Another factor to consider is that the greatest majority of the entries in RICE are commercially available packages. Although there are plans to include public domain packages in RICE, they have a lower priority for entry into the system. The other popular microcomputers in the education market, namely the TRS-80 and the Commodore PET, rely heavily on public domain for their

Figure 5



KEY

APPLE	Apple II, II plus, IIe and III	ATARI	Atari 400, 800, 1200 and XL series
TRS80	TRS-80 model I, III, IV and Color Computer	TI-99	TI-99/4 and TI-99/4A
COMMO	Commodore 64, Pet and Vic	IBM	IBM PC and PCjr.

educational software base. Other computers such as the Commodore 64, Vic-20, and the Texas Instruments 99/4 appeal more to the home market than the education market, thus limiting the number of packages shown here. The IBM PC has achieved a certain degree of dominance in the business market but only recently has made progress in the education market. Many courseware developers are converting packages written for other machines to the IBM PC. With this and the introduction of the PCjr., a significant increase in the amount of courseware available for the IBM PC and PCjr. can be expected.

The total of the 6 hardware types shown on the graph is 147 percent. This is greater than 100 percent because many packages are available on more than one machine.

BY COST

Although cost is an important factor to consider in any CAI program, it was not possible to generate similar data on the cost of available packages for several reasons. First, not all packages have one price. For example, it is not at all uncommon to find a package to be one in a series of packages sold separately for one price and together for another price. Second, prices differ between distributors and producers. And third, prices are constantly changing. To complicate matters even more, prices range widely from a low of around $7.95 for a cassette tape containing one program to several thousand dollars for a comprehensive package. There doesn't appear to be any easy way to understand the pricing of educational courseware. But, there does appear to be a large number of packages in the range from forty to seventy dollars. This interval appears to be the pricing structure acceptable to both the consumer and producer of courseware. In cases where the package is too comprehensive to fit within that price range, producers will often divide the product into smaller packages to meet this pricing interval.

A WORD OF CAUTION

If one were to describe the typical educational courseware package of the early 1980s, one might conclude that it would have to be a secondary math drill and practice package for the Apple. By the evidence presented here, this conclusion certainly seems logical. However, the number of packages meeting ALL of these conditions is only a small percentage of the total number of available packages. The error comes when the results of one graph are added to the results of the others. It must be remembered that the graphs look at the SAME data from a variety of points of view.

SPECULATION ABOUT FUTURE AVAILABILITY

What can be expected in future years concerning the availability of courseware? Before this question can be addressed, the relationship between hardware and software availability must first be understood.

At a recent meeting of MicroSIFT representatives with major courseware developers, it was made clear that the development of courseware is primarily influenced by market. There must be a certain number of prospective buyers before producers will begin to develop a product. The size of a market is directly related to the number of computers being used in schools. As the number of computers in schools increases, so will courseware availability. Unfortunately, the lag time between the arrival of the computer and the availability of the courseware poses a problem for practitioners.

The affect of the home market on the development and availability of courseware is another point to consider. Future Computing estimates that the home market makes up 70 percent of the total educational courseware market. Producers are heavily influenced by this fact, which poses certain problems for educators. Packages designed for the home typically do not have the support materials teachers need and demand for classroom use. In spite of marketing direction, packages intended for home use find their way into schools. Recently, producers have realized the difference between these two markets, and have begun to develop two versions of the same package tailored to the needs of the appropriate group.

Another problem arises in areas where the market is small and is likely to remain so. In some cases, special projects funded through NIE and NSF provide for the development of these orphan markets. However, the demand far outstrips the supply.

Assuming that the market will continue to grow and that schools will continue to purchase computer hardware and courseware, what availability can be expected in coming years? First, there will probably always be more courseware available for the upper grades than for the lower grades. However, an equalizing of the number of available packages for upper and lower grades can be expected as computers become easier to use, and more available in elementary schools.

Secondly, the core subject areas will continue to be dominant since the greatest portion of dollars spent by schools are in these areas.

Third, as packages become more sophisticated, there will be a tendency to employ a wider variety of instructional modes. The state-of-the-art packages of today incorporate several instructional modes for one application. These packages use whichever instructional mode is most appropriate to accomplish the task at hand, with smooth transitions from one mode to another. As this level of sophistication becomes the norm, instructional mode will become less important.

Finally, there is also a trend away from the CAI application of the computer toward its use as a tool for the student. The success of Bank Street Writer as a simple word processor is an example of this trend. Simple spreadsheet and database management packages on the same order can be expected in the near future.

MORE ABOUT RICE

RICE (Resources In Computer Education) is a comprehensive database of information about microcomputer courseware for use in elementary and secondary education. It contains information on some 300 courseware producers, 2400 courseware packages, 170 computer literacy support materials, and 80 projects. This database has been developed by the Northwest Regional Educational Laboratory's Computer Technology Program with support from the National Institute of Education. RICE is available on the BRS, Inc. computer system and may be searched electronically by subject, level, hardware type, and many other categories. Access to BRS for the purpose of RICE searches is available through many college or university libraries; education service agencies; or the Northwest Regional Educational Laboratory, 300 S.W. Sixth Avenue, Portland, OR 97204, telephone 503/248-6800.

Questions regarding procedures for obtaining your own access to BRS should be directed to your local Scott, Foresman and Company representative.

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